ENVIRONMENTAL ASSESSMENT

AND

REGULATORY IMPACT REVIEW

FOR AN

EMERGENCY RULE

TO REDUCE SEA TURTLE BYCATCH AND BYCATCH MORTALITY IN THE ATLANTIC PELAGIC LONGLINE FISHERY

United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Highly Migratory Species Management Division

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Emergency Rule to Reduce Sea Turtle Bycatch and Bycatch Mortality in the Atlantic Pelagic Longline Fishery

Actions:	Reduce levels of sea turtle bycatch and bycatch mortality in the Atlantic highly migratory species pelagic longline fishery by closing the Northeast Distant Statistical Reporting Area and implementing gear requirements for all Federally highly migratory species permitted vessels using pelagic longline gear. Require all vessels permitted for HMS fisheries to post the NMFS issued sea turtle handling and release guidelines in the wheelhouse to help reduce the post-release mortality of incidentally captured sea turtles.
Type of statement:	Environmental Assessment and Regulatory Impact Review
Lead Agency:	National Marine Fisheries Service
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Abstract: On June 8, 2001, NMFS issued a Biological Opinion concluding that the continued operation of the Atlantic pelagic longline fishery is likely to jeopardize the continued existence of the loggerhead sea turtle and the leatherback sea turtle. This emergency rule implements the elements of the reasonable and prudent alternative identified in the Biological Opinion to reduce the levels of sea turtle bycatch and bycatch mortality in the Atlantic pelagic longline fishery (which includes the Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea). In this document, the Office of Sustainable Fisheries of the National Marine Fisheries Service examines methods of reducing the levels of both sea turtle take and mortality, including maintaining the fishery in a status quo condition, area closures, gear deployment modifications to reduce interactions, prohibition of pelagic longlining by United States flagged vessels, and other gear requirements that could reduce bycatch mortality. The final action implements an area closure and gear requirements, which will reduce sea turtle takes and associated mortality. The National Marine Fisheries Service expects an experimental fishery to be established in the closed area to test measures that could potentially reduce the incidental capture of sea turtles in domestic and international fishing fleets. Based on the information presented in the Biological Opinion, these actions are necessary to remove the appreciable effect of this fishery on the sustainability and recovery of Atlantic loggerhead and leatherback sea turtle populations.

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1.0. PURPOSE AND NEED FOR ACTION

1.1 Introduction

The Biological Opinion (BO) issued on June 8, 2001, by the National Marine Fisheries Service's (NMFS) Office of Protected Resources concluded that the continued operation of the Atlantic pelagic longline fishery is likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. Under the Endangered Species Act (ESA), the Highly Migratory Species (HMS) Management Division of the Office of Sustainable Fisheries is required to implement the elements of the reasonable and prudent alternative (RPA) identified in the BO to address sea turtle takes and associated mortality.

The BO specifies a RPA that will avoid the likelihood of jeopardizing the continued existence of these turtles. The RPA includes the following elements: closing the northeast distant statistical reporting (NED) area effective July 15, 2001; requiring gangions to be placed no closer than twice the average gangion length from the suspending floatlines effective August 1, 2001; and requiring gangion lengths to be 110 percent of the length of the floatline in sets of 100 meters or less in depth effective August 1, 2001. As described in the June 4, 2001, fax notice and Federal Register notice (66 FR 29934), NMFS intends to issue an Endangered Species Act Section 10 permit allowing an experimental fishery to occur in the NED by August 1, 2001. Also, the BO includes a term and condition for the incidental take statement that requires NMFS to issue a regulation requiring that all vessels permitted for HMS fisheries, commercial and recreational, post the sea turtle guidelines for safe handling and release following longline interactions inside the wheelhouse by September 15, 2001.

1.2 Reinitiation of Consultation

Several circumstances can create the need to reinitiate consultation: the regulated action exceeds the incidental take statement, a change in action that was not previously considered, or a change in the population status of a listed species. NMFS' Office of Sustainable Fisheries requested reinitiation of consultation on HMS fisheries on November 19, 1999, based on preliminary information that the number of loggerhead sea turtles incidentally taken in the pelagic longline fishery had exceeded levels anticipated in the April 23, 1999, BO. The bycatch reduction rule (proposed December 15, 1999, 64 FR 69982; final August 1, 2000, 65 FR 47214), which constituted a major action that may have affected the operation of the pelagic longline fishery in a manner not considered in the April 23, 1999, BO, also triggered the need to reinitiate consultation.

On June 30, 2000, a BO was issued that evaluated the current status of the loggerhead and leatherback sea turtles and concluded that the current actions of the pelagic longline fishery jeopardized the continued existence of these species. This conclusion was based on the status of the loggerhead and leatherback sea turtle populations in the Atlantic Ocean, Caribbean, and Gulf of Mexico, the status of the northern subpopulation of loggerhead sea turtle, and the anticipated

continuation of current levels of injury and mortality of both species described in the environmental baseline and cumulative effects section of the BO at that time. After this BO was released, NMFS concluded that further analyses of observer data and additional population modeling of loggerhead sea turtles were needed to determine more precisely the impact of the pelagic longline fishery on sea turtles. Because of this, NMFS did not implement all the RPAs contained in the BO and reinitiated consultation on the HMS fisheries on September 7, 2000.

On October 13, 2000, NMFS issued emergency regulations that closed an L-shape portion of the NED from October 10, 2000, through April 9, 2001 (65 FR 60889). This closure was expected to reduce the incidental capture of loggerhead and leatherback sea turtles. The emergency regulations also required the use of dipnets and line clippers meeting NMFS design and specification criteria to remove entangling fishing gear and reduce post-release mortality of captured sea turtles. The gear requirements were extended indefinitely by an interim final rule that was effective April 10, 2001 (see 66 FR 17370, March 30, 2001).

In January 2001, NMFS held a technical gear workshop in Silver Spring, MD that was attended by scientists and fishermen. Additionally, the Southeast Fisheries Science Center (SEFSC) published the Stock Assessments of Loggerhead and Leatherback Sea Turtles and an Assessment of the Impact of the Pelagic Longline Fishery on the Loggerhead and Leatherback Sea Turtles of the Western North Atlantic in February 2001. The June 8, 2001, BO incorporates the new information from the assessment reports and the gear workshop in its examination of the effect of the pelagic longline fishery on sea turtles in the western Atlantic Ocean.

1.3 Reasonable and Prudent Alternative

The June 8, 2001, BO concluded that the Atlantic Pelagic Longline Fisheries for Swordfish, Tuna, and Shark, in the U.S. Atlantic, as currently operated, are likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. The clause "jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR §402.02).

Regulations implementing section 7 of the ESA (50 CFR §402.02) define RPAs as alternative actions, identified during formal consultation, that: (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the action agency's legal authority and jurisdiction; (3) are economically and technologically feasible; and (4) would avoid the likelihood of jeopardizing the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

Based on analyses of sea turtle populations in the Atlantic Ocean, NMFS' SEFSC concluded that an increase in pelagic juvenile stage survival of 10 percent, throughout the Atlantic Basin, would be necessary to move population trajectories from approximately stable to increasing or from

declining to approximately stable. To achieve a 10 percent increase in annual survival, these analyses concluded that a 55 percent reduction in anthropogenic mortality of pelagic juvenile loggerheads is necessary. The reduction in anthropogenic mortality needed for leatherbacks could not be quantified.

As previously discussed, the ESA requires that any RPA must remove the jeopardy posed to loggerhead and leatherback sea turtles by the operation of the U.S. Atlantic pelagic longline fleet. The RPA in the June 8, 2001, BO is designed to reduce the effects of the pelagic longline fisheries, targeting HMS only, to such a degree that the effects are not likely to appreciably reduce these turtles' likelihood of surviving and recovering in the wild. The June 8, 2001, BO identified a single RPA, consisting of several elements, that must be implemented in its entirety to avoid jeopardizing the listed species. The RPA consists of the following measures, which will be discussed in more detail later in this document:

1) *Closure of the NED Area to U.S. Pelagic Longline Fishing*. Regulations that close the entire NED area to U.S. vessels fishing with pelagic longline gear must become effective no later than July 15, 2001.

2) *Restrictions on hook attachment relative to floatlines on pelagic longline gear*. These regulations must be published no later than July 15, 2001, with a delayed effective date of August 1, 2001. Specifically, gangions may not be attached next to floatlines nor to the mainline except at a distance from the attachment point of the floatline to the mainline, along the mainline, of at least twice the length of the average gangion length in the set.

3) *Restriction on gangion length in shallow pelagic longline sets.* NMFS must promulgate final regulations in the Atlantic pelagic longline fleet that require that, in shallow longline sets, the length of the gangion be greater than the length of the floatline. This must be published no later than July 15, 2001, with a delayed effective date of August 1, 2001.

4) *Requirement to use corrodible hooks and crimps*. By August 1, 2001, NMFS must identify criteria for, and assess the commercial availability of, corrodible hooks and crimps that are the most effective at reducing post-hooking injury. By December 31, 2001, NMFS must promulgate final regulations that require participants in pelagic longline fisheries in the Atlantic to use only corrodible hooks and crimps determined to be effective at reducing impacts to turtles. If no commercial hooks or crimps are identified that meet the criteria, then NMFS must begin development of such hooks and crimps and implement regulations to require their use no later than March 1, 2002.

1.4 Purpose and Scope

The purpose of this action is to implement the RPA identified in the June 8, 2001, BO issued under the authority of the ESA. The scope of this action is to address sea turtle interactions in the Atlantic HMS fisheries, particularly those vessels using pelagic longline gear.

2.0 ALTERNATIVES INCLUDING THE SELECTED ACTIONS

2.1 Measures to Reduce Bycatch of Sea Turtles

Final Action: **Closure of the NED area to pelagic longlining for the duration of the emergency rule[1] beginning July 15, 2001**

This action will close the NED area (20 to 60° W, 35 to 55° N) beginning July 15, 2001, to HMS fishermen, or to fishermen who are required to have HMS permits, who use pelagic longline gear for the duration of the emergency rule. NMFS expects an experimental fishery to be conducted in this area to examine gear modifications that will reduce the incidental capture of sea turtles, contingent on the approval of the permit by the Office of Protected Resources.

Final Action: **Prohibit the setting of gangions next to floatlines**

This action will prohibit the attachment of gangions to the mainline within two gangion lengths of the floatline attachment to the mainline for all Federally permitted vessels, or those required to be permitted, engaged in pelagic longline fishing for HMS for the duration of the emergency rule.

Not Selected at this Time: **Prohibit the use of certain types of bait**

This alternative would be contingent upon the measures scheduled to be tested in the NED experimental fishery. The experiment will analyze the effectiveness of different types of bait: blue-dyed squid and mackerel versus natural squid in reducing the capture of sea turtles.

Not selected: **Status Quo**

This alternative would maintain the existing regulations for the pelagic longline fishery in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea.

Not selected: **Prohibit use of pelagic longline gear by U.S.-flagged fishing vessels in the Atlantic Ocean, including the Gulf of Mexico and Caribbean Sea**

This alternative would prohibit the use of pelagic longline gear in Atlantic HMS fisheries year-round.

[1] Emergency rules are effective for 180 days from the date of publication in the Federal Register. Emergency rules may be extended for an additional 180 days if notice and a comment period are provided.

2.2 Measures to Reduce Mortality of Incidentally Captured Sea Turtles

Final Action: **Require gangion length to be 110 percent of floatline length in shallow sets (hooks fished at depths of 100 meters or less)**

All vessels issued Federal limited access permits, or those required to be permitted, engaged in pelagic longline fishing for HMS would be required to deploy gangions that are 10 percent longer than the floatlines, if the length of the floatlines plus the length of the gangions are 100 meters or less, for the duration of the emergency rule.

Final Action: **Require the posting of the sea turtle guidelines for safe handling in longline interactions inside the wheelhouse.**

All vessels permitted, or required to be permitted, for HMS fisheries would be required to have the guidelines for the handling and release of sea turtles incidentally captured by pelagic longline gear posted in their wheelhouse to provide better guidance in the event of a sea turtle hooking or entanglement for the duration of the emergency rule.

Not Selected At This Time: **Require a dehooking device to be used and carried on board pelagic longline vessels**

All Federally permitted vessels engaged in pelagic longline fishing for HMS would be required to have a dehooking device on board and use it to remove gear from incidentally captured turtles.

Not Selected at this Time: **Require use of corrodible hooks on all pelagic longline gear**

All Federally permitted vessels engaged in pelagic longline fishing for HMS would be required to use corrodible hooks only. The adoption of this measure is contingent upon the outcome of experiments to test the corrodible nature of current hooks.

Not Selected at this Time: **Require use of circle hooks on all pelagic longline gear**

All Federally permitted vessels engaged in pelagic longline fishing for HMS would be required to use circle hooks only.

3.0 AFFECTED ENVIRONMENT

Pelagic longline fishermen encounter many species of fish; some of those captured are marketable and thus are retained, others are discarded for economic or regulatory reasons. Species frequently encountered are swordfish, tunas, and sharks, as well as billfish, dolphin, wahoo, king mackerel, and other finfish species. Sometimes pelagic longline fishermen also catch sea turtles, marine mammals, and sea birds, known collectively as "protected" species. All of these species are Federally managed, and NMFS seeks to control the mortality that results from fishing effort. Detailed descriptions of the life histories and population status of these species are given in the HMS FMP and are not repeated here. Management of declining fish populations requires reductions in fishing mortality from both directed and incidental fishing sources. The status of the stocks of Atlantic swordfish, Atlantic billfish, Atlantic tunas, large coastal and pelagic sharks are summarized in chapter 2 of the 2001 SAFE Report, and are not repeated here.

3.1 Sea Turtles

Loggerhead and leatherback sea turtles are the species predominantly caught in the Atlantic pelagic longline fishery. Sea turtles are caught throughout the range of the fishery (Gulf of Mexico, Caribbean, Florida to Maine, and outside the U.S. EEZ), but the sets with the most turtles incidentally captured occur in the NED area (see Figure 3.1) in the third and fourth quarter of each year. Many sea turtle populations are slow to recover from increased fishing mortality because their reproductive potential is low (late sexual maturation, low juvenile survival). General information about the biology and status of sea turtles can be found in the Recovery Plans for each species (available through the Office of Protected Resources, NMFS); the status of the loggerhead and leatherback sea turtle populations are discussed in Section 3.2. While a high percentage of sea turtles are released alive from pelagic longline entanglements, NMFS is concerned about the frequency of interactions and the level of post-release mortality.

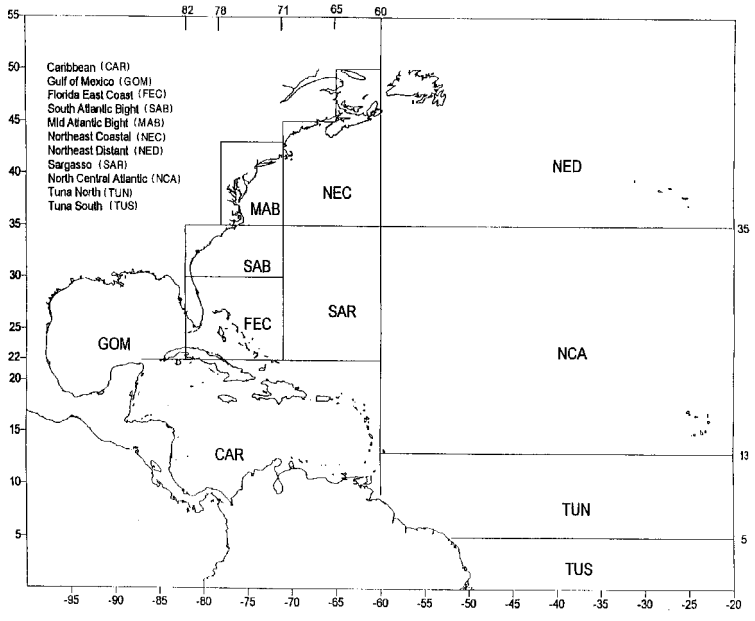

Figure 3.1 **Geographic areas used in summaries of pelagic logbook data from 1992 - 1998.** Source: Cramer and Adams, 2000.

3.2 Summary of the Status of Loggerhead and Leatherback Sea Turtles

The following represents a summary of the information found in the June 8, 2001, BO. For more detailed information, please see that document.

Loggerhead sea turtles
The loggerhead sea turtles in the action area represent differing proportions of five Western North Atlantic subpopulations, as well as unidentified subpopulations from the eastern Atlantic. The June 8, 2001, BO considers these subpopulations for the analysis, with particular emphasis on the northern subpopulation of loggerhead sea turtles. Loggerheads reported captured in the pelagic longline fishery in the open ocean are mostly pelagic juveniles, with approximately 19 percent of the captured turtles expected to be from the northern subpopulation.

In examining the nesting trend for the northern subpopulation, the turtle expert working group (TEWG) concluded that it is stable or declining (1998, 2000). The analysis described in the NMFS SEFSC 2001 stock assessment report summarized the trend analyses for the number of nests sampled from beaches for the northern subpopulation and the south Florida subpopulation and concluded that from 1978-1990, the northern subpopulation has been stable at best and possibly declining (less than 5 percent per year). From 1990 to the present, the number of nests in the northern subpopulation has been increasing at 2.8-2.9 percent annually; however, there are confidence intervals about these estimates that include no growth (0 percent). Over the same time frame, the south Florida population has been increasing at 5.3-5.4 percent per year from 1978-1990, and increasing at 3.9-4.2 percent since 1990. However, NMFS SEFSC (2001) cautions that "it is an unweighted analysis and does not consider the beaches' relative contribution to the total nesting activity of the subpopulation and must be interpreted with some caution." Furthermore, although the analysis was limited to data from beaches where the effort was believed to have been relatively constant over time, this assumption of consistent effort may not always be true.

Loggerhead sea turtles are primarily exposed to pelagic longline gear in the pelagic juvenile stage. According to observer records, an estimated 7,891 loggerhead sea turtles were caught by the U.S. Atlantic tuna and swordfish longline fisheries between 1992-1999, of which 66 were released dead (see Table 3.1). However, the U.S. fleet accounts for a small proportion (5-8 percent) of the total hooks fished in the Atlantic Ocean compared to other nations, including Taipei, Brazil, Trinidad, Morocco, Cyprus, Venezuela, Korea, Mexico, Cuba, U.K., Bermuda, People's Republic of China, Grenada, Canada, Belize, France, and Ireland (Carocci and Majkowski 1998). Reports of incidental takes of turtles are incomplete for many of these nations (see NMFS SEFSC 2001 for a complete description of take records). Projections based on known takes for the 23 actively fishing countries, after accounting for the unobserved fraction, likely result in an estimate of thousands of animals annually over different life stages.

Table 3.1 Annual estimates of total marine turtle bycatch and the subset that were dead when released in the U.S. pelagic longline fishery. Source: June 8, 2001, BO.

Species	Loggerhead		Leatherback		Green		Hawksbill		Kemp's Ridley		Unidentified		Sum Total
Year	Total	Dead*	Total	Dead*	Total	Dead*	Total	Dead*	Total	Dead*	Total	Dead*	
1992	293	0	914	88	87	30	20	0	1	0	26	0	1,341
1993	417	9	1,054	0	31	0					31	0	1,533
1994	1,344	31	837	0	33	0			26	0	34	0	2,274
1995	2,439	0	934	0	40	0					171	0	3,584
1996	917	2	904	0	16	2					2	0	1,839
1997	384	0	308	0			16	0	22	0	47	0	777
1998	1,106	1	400	0	14	1	17	0			1	0	1,538
1999	991	23	1,012	0							66	0	2,069
Total	7,891	66	6,363	88	221	33	53	0	49	0	378	0	14,955

* Does not account for fishing related mortality that may occur after release.

Leatherback sea turtles

Female leatherback sea turtles nest from southeastern United States to southern Brazil in the western Atlantic and from Mauritania to Angola in the eastern Atlantic. The most significant nesting beaches in the Atlantic, and perhaps in the world, are in French Guiana and Surinam (see NMFS SEFSC 2001). When they leave the nesting beaches, leatherback sea turtles move offshore but eventually utilize both coastal and pelagic waters. The leatherback is the largest living turtle and it ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS 1995). Leatherback sea turtles feed primarily on cnidarians (medusae, siphonophores) and tunicates (salps, pyrosomas) and are often found in association with jellyfish.

The conflicting information regarding the status of Atlantic leatherback sea turtles makes it difficult to conclude whether or not the population is currently in decline. Numbers at some nesting sites are up, while at others they are down. Data collected in southeast Florida clearly indicate increasing numbers of nests for the past twenty years (9.1-11.5 percent increase), although it is critical to note that there was also an increase in the survey area in Florida over time (NMFS SEFSC 2001). The largest leatherback rookery in the western North Atlantic remains along the northern coast of South America in French Guiana and Suriname. While Spotila *et al.* (1996) indicated that turtles may have been shifting their nesting from French Guiana to Suriname due to beach erosion, analyses show that the overall area trend in number of nests has been negative since 1987, declining at a rate of 15.0 - 17.3 percent per year (NMFS SEFSC 2001, Appendix 1). If turtles are not nesting elsewhere, it appears that the Western Atlantic portion of the population is being subjected to high anthropogenic mortality rates, resulting in a continued decline in numbers of nesting females.

Leatherback sea turtles are exposed to pelagic fisheries throughout their life cycle. According to observer records, an estimated 6,363 leatherback sea turtles were caught by the U.S. Atlantic tuna and swordfish longline fisheries between 1992-1999, of which 88 were released dead (NMFS SEFSC 2001). Leatherback sea turtles make up a significant portion of takes in the Gulf of Mexico and South Atlantic areas, but are more often released alive. The U.S. fleet accounts for 5-8 percent of the hooks fished in the Atlantic Ocean. Other nations, including Taipei, Brazil, Trinidad, Morocco, Cyprus, Venezuela, Korea, Mexico, Cuba, U.K., Bermuda, People's Republic of China, Grenada, Canada, Belize, France, and Ireland also fish in these waters (Carocci and Majkowski 1998). Reports of incidental takes of turtles are incomplete for many of these nations (see NMFS SEFSC 2001, for a complete description of take records). Projections based on known takes from the 23 actively fishing countries, after accounting for the unobserved fraction, likely result in estimates of thousands of leatherback sea turtles annually over different life stages.

4.0 DESCRIPTION OF THE PELAGIC LONGLINE FISHERY FOR ATLANTIC HMS

4.1 Domestic Fishery

The U.S. pelagic longline fishery for Atlantic HMS primarily targets swordfish, yellowfin tuna, or bigeye tuna in various areas and seasons. Although this gear can be modified (i.e., depth of set, hook type, etc.) to target either swordfish or tuna, like other hook and line fisheries, it is a multi-species fishery. These fisheries are opportunistic, switching gear style and making subtle changes to target the best available economic opportunity for each individual trip. Longline gear sometimes attracts and hooks non-target finfish with no commercial value, as well as species that cannot be legally retained by commercial fishermen, such as billfish. Pelagic longlines may also interact with protected species such as marine mammals, sea turtles and sea birds.

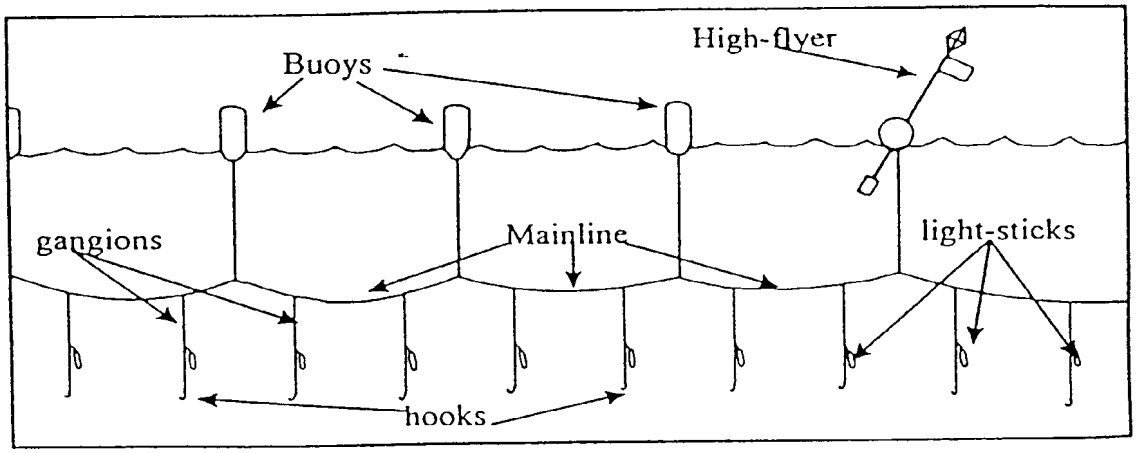

Figure 4.1 Typical U.S. pelagic longline gear[2]. Source: Arocha, 1996.

Pelagic longline gear is composed of several parts (see Figure 4.1). The primary fishing line, or mainline of the longline system, can vary from five to 40 miles in length, with approximately 20 to 30 hooks per mile. The depth of the mainline is determined by ocean currents and the length of the floatline, which connects the mainline to several buoys and periodic markers with radar reflectors and radio beacons. Each individual hook is connected by a leader to the mainline. Lightsticks, which contain chemicals that emit a glowing light, are often used, particularly when targeting swordfish. When attached to the hook and suspended at a certain depth, lightsticks attract bait fish which may, in turn, attract pelagic predators. When targeting swordfish, the lines generally are deployed at sunset and hauled in at sunrise to take advantage of nocturnal near-

[2] As of April 1, 2001 (66 FR 17370), a vessel is considered to have pelagic longline gear on board when a power-operated longline hauler, a mainline, floats capable of supporting the mainline, and leaders (gangions) with hooks are on board.

surface feeding habits (Berkeley *et al*., 1981). In general, longlines targeting tuna are set in the morning, deeper in the water column, and hauled in the evening. Except for vessels of the distant water fleet which undertake extended trips, fishing vessels preferentially target swordfish during periods when the moon is full to take advantage of increased densities of pelagic species near the surface.

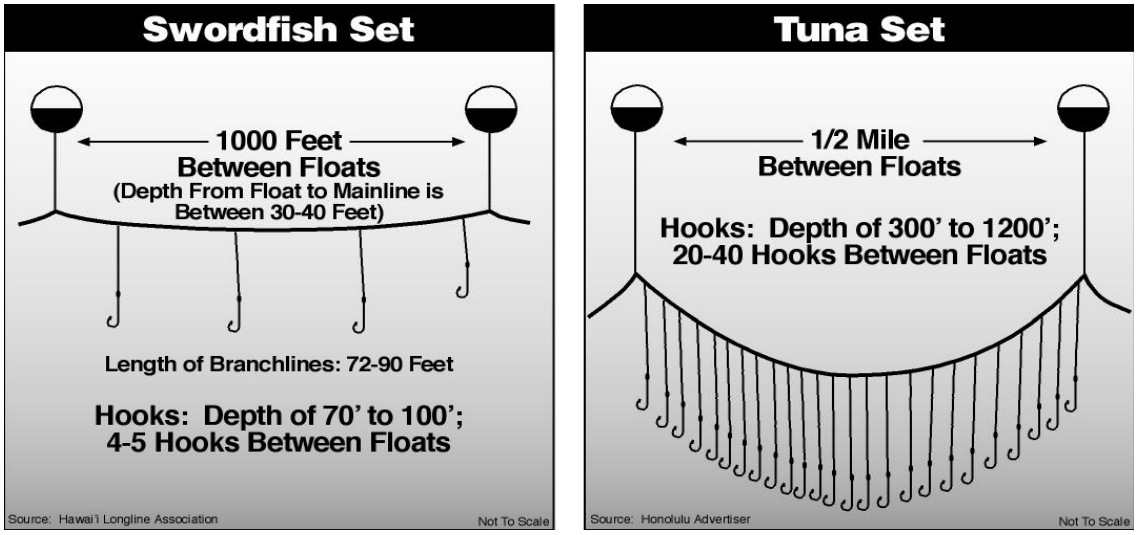

Figure 4.2 **Different longline gear deployment techniques.** Source: Hawaii Longline Association and Honolulu Advertiser.

Figure 4.2 illustrates the difference between swordfish (shallow) sets and tuna (deep) longline sets. Compared with vessels targeting swordfish or mixed species, vessels targeting tuna typically are smaller and fish different grounds. Swordfish sets are buoyed to the surface, have few hooks between floats, and are relatively shallow. This same type of gear arrangement is used for mixed target sets. Tuna sets use a different type of float placed much further apart. Compared with swordfish sets, there are more hooks per foot between the floats and the hooks are set much deeper in the water column. It is believed that because of the difference in fishing depth, tuna sets hook less turtles than the swordfish sets. This factor is addressed by requiring the gangions to be longer than the floatlines in shallow longline sets (hooks fished at a depth of 100 meters or less). The hook types are also different for each target species. Swordfish sets generally use "J" hooks and tuna sets use "tuna" hooks, which are more curved than "J" hooks. In addition, tuna sets use bait only while swordfish fishing uses a combination of bait and lightsticks.

The pelagic longline fishery is comprised of five relatively distinct segments/fisheries with different fishing practices and strategies, including the Gulf of Mexico yellowfin tuna fishery, the south Atlantic-Florida east coast to Cape Hatteras swordfish fishery, the mid-Atlantic and New England swordfish and bigeye tuna fishery, the U.S. distant water swordfish fishery, and the Caribbean Islands tuna and swordfish fishery. Each vessel type has different range capabilities due to fuel capacity, hold capacity, size, and construction. In addition to geographical area, segments differ

by percentage of various target and non-target species, gear characteristics, bait, and deployment techniques. Some vessels fish in more than one fishery segment during the course of the year. Pelagic longline catch (including bycatch, incidental catch, and target catch) is largely related to these vessel and gear characteristics in addition to season and fishing area.

Please refer to section 2.5.1 of the HMS FMP and section 6.0 of the Final Supplemental Environmental Impact Statement to reduce bycatch, bycatch mortality, and incidental catch in the Atlantic pelagic longline fishery (NMFS 2000b) for a more detailed description and explanation of the Atlantic pelagic longline fishery.

4.2 International Fishery

The U.S. pelagic longline fleet in the Atlantic captures sea turtles at a rate estimated to average 986 loggerheads and 796 leatherbacks per year, based on observed takes and total reported effort from 1992 to 1999. Most of these takes occur on the high seas, rather than within the U.S. EEZ. The U.S. fleet is a small part of the international fleet that competes on the high seas for catches of tunas and swordfish. Although the U.S. fleet landed as much as 35 percent of the swordfish from the North Atlantic, north of 5°N. latitude in 1990, this proportion decreased to 25 percent by 1997. For tunas, the U.S. proportion of landings was 23 percent in 1990 decreasing to 16 percent by 1997. The U.S. fleet accounts for none or virtually none of the landings of swordfish and tuna from the Atlantic Ocean, south of 5°N. latitude, and does not operate at all in the Mediterranean Sea. Tuna and swordfish landings by foreign fleets operating in the tropical Atlantic and Mediterranean, are greater than the catches from the North Atlantic area where the U.S. fleet operates. Even within the area where U.S. fleet operates, the U.S. portion of fishing effort, in numbers of hooks fished is less than 10 percent of the entire international fleet's effort, and likely less than that due to differences in reporting effort between ICCAT countries (NMFS SEFSC 2001, Part III, Chap. 1). Since other ICCAT nations do not monitor incidental catches of sea turtles, an exact assessment of their impact is not possible. High absolute numbers of sea turtle catches in the foreign fleets have been reported from other sources, however (NMFS SEFSC 2001, Part III, Chap. 1). If the sea turtle catch rates of foreign fleets, per hook, or even per pound of swordfish landed, are similar to the catch rates of the American fleet, then the American fleet may represent less than one-tenth and certainly no more than one-third of the total catch and mortality of sea turtles in North Atlantic longline fisheries.

Mortality in the domestic and foreign longline fisheries is just one of the numerous factors affecting sea turtle populations in the Atlantic (National Research Council 1990). Many sources of anthropogenic mortality are outside of U.S. jurisdiction and control. If the U.S. swordfish quota was to be relinquished to other fishing nations, the effort now expended by the U.S. fleet would be replaced by foreign effort. This would significantly alter the U.S. position at ICCAT and make the implementation of international conservation efforts more difficult. This would also eliminate the option of gear or other experimentation with the U.S. longline fleet, thus making it difficult to find take reduction solutions which could be transferred to other longlining nations to effect a greater global reduction in sea turtle takes in pelagic longline fisheries. NMFS is not

aware of any foreign fleets that are currently using any conservation measures, and in the absence of a domestic fishing fleet subject to turtle conservation measures, foreign vessels would likely increase their fishing effort and it is likely that turtle mortality would increase.

Table 4.1: Estimated International Longline Landings of HMS, Other than Sharks, for All Countries in the Atlantic: 1995-1999 (mt ww)*. Source: NMFS 2001d.

	1996	**1997**	**1998**	**1999**
Swordfish (N. Atl. + S. Atl)	31438	30375	24203	25695
Yellowfin Tuna (W. Atl)**	8569	8505	8181	10943
Bigeye Tuna	74880	68198	70302	77356
Bluefin Tuna (W. Atl.)**	528	382	764	914
Albacore Tuna (N. Atl + S. Atl)	23044	22324	20936	24936
Skipjack Tuna***	26	60	89	13
Blue Marlin (N. Atl. + S. Atl.)****	3577	3626	2390	2522
White Marlin (N. Atl. + S. Atl.)****	1171	942	831	833
Sailfish (W. Atl.)****	341	209	830	405
Total	**143,574**	**134,621**	**128,526**	**143,617**
U.S. Longline Landings (from U.S. Natl. Report, 2000)#	**5767.3**	**8931.7**	**7194.3**	**8362-8483**
U.S. Longline as Percentage of Longline Total	**4.0**	**6.6**	**5.6**	**5.9**

*** landings include those classified by the SCRS as longline landings for all areas**

****Note that the U.S. has not reported participation in the E. Atlantic yellowfin tuna fishery since 1983 and has not participated in the E. Atl bluefin tuna fishery since 1982.**

*****includes longline and trawl catches for all countries throughout the Atlantic Ocean**

******includes U.S. *dead discards***

 # includes swordfish longline discards and bluefin tuna discards

4.3 Effect of Pelagic Longline Interactions on Sea Turtles

The following represents a summary of the information found in the June 8, 2001, BO. More detailed information can be obtained from that document.

Entanglement

Sea turtles are particularly prone to entanglement as a result of their body configuration and behavior. Sea turtles have been found entangled in gangions, mainlines, and floatlines. Longline gear is fluid and can move according to oceanographic conditions determined by wind and waves, surface and subsurface currents, *etc.*; therefore, depending on both sea turtle behavior, environmental conditions, and location of the set, turtles can become entangled in longline gear. If sea turtles become entangled in monofilament line (mainline, gangion or float line) the gear can inflict serious wounds, including cuts, constriction, or bleeding anywhere on a turtle's body. In addition, entangling gear can interfere with a turtle's ability to swim or impair its feeding, breeding, or migration. Sea turtles that are entangled in the longline fishery are most often entangled around the neck and foreflippers, and, in the case of leatherback turtles, are often found snarled in mainlines, floatlines, and branchlines (*e.g.*, Hoey 2000). NMFS has determined that sea turtles that are entangled and not hooked and have the gear completely removed have an expected mortality rate of zero. However, if the gear is not removed, NMFS expects a mortality rate of 27 percent (NMFS 2001b).

Hooking

In addition to being entangled in a longline, sea turtles are also injured and killed by being hooked. Hooking can occur as a result of a variety of scenarios, some of which will depend on foraging strategies and diving and swimming behavior of the various species of sea turtles. Sea turtles are hooked either externally (generally in the flippers, head or beak) or internally (when the animal has attempted to forage on the bait, and ingests the hook). NMFS has reviewed the scientific and commercial information available on sea turtle mortalities associated with hooking interactions and believes that 27 percent of the loggerhead turtles hooked in their beak or mouth and 27 percent of the leatherback turtles that were hooked in their flippers would be expected to die. Also, 42 percent of the loggerhead turtles that ingested hooks would be expected to die (NMFS 2001b).

Submergence

Sea turtles can be forcibly submerged by longline gear, through a hooking or entanglement event, and the turtle maybe unable to reach the surface to breathe. This can occur at any time during the set, including the setting and hauling of the gear, and generally occurs when the sea turtle encounters a line that is too short to reach the surface or is too heavy to be brought up to the surface by a swimming sea turtle. Respiratory and metabolic stress due to forcible submergence is also correlated with additional factors such as size and activity of the sea turtle (including dive limits), water temperature, and biological and behavioral differences between species. Such factors therefore also affect the survivability of turtles hooked or entangled on a longline. For example, larger sea turtles are capable of longer voluntary dives than small turtles, so juveniles may be more vulnerable to the stress of forced submergence than adults. Although a low percentage (typically < 1 percent) of turtles that are captured by longliners actually are reported dead, sea turtles can drown from being forcibly submerged. If observed takes and mortalities are adjusted for the sample fraction of observed sets (see NMFS SEFSC 2001 for computations), an

estimated average of 986 loggerhead and 795 leatherback turtles were captured in the fishery each year from 1992 to 1999, of which 8 and 11, respectively, were estimated to be dead upon retrieval.

4.4 Gear Research

To achieve comprehensive sea turtle take reductions in pelagic longline fisheries throughout the Atlantic that will have a long-term significant effect on loggerhead and leatherback survival and recovery, mitigation measures must be found that can be implemented by the longline fishery, both domestically and internationally. Discovering fishing tactics and modified gear configurations that allow pelagic longline vessels to continue to catch target species effectively while reducing the likelihood of catching loggerhead and leatherback sea turtles should be a priority. Ideally, an experimental fishery involving the U.S. Atlantic pelagic longline fleet would test measures that both reduce the capture of sea turtles globally and are transferable to the international longline fleets. In order to implement this research, NMFS is seeking authorization for an experimental fishery through application for an ESA section 10 scientific research permit that was submitted May 31, 2001.

5.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES CONSIDERED

Based on the jeopardy finding for the pelagic longline fishery and the reasonable and prudent alternative outlined in the June 8, 2001, BO, NMFS is implementing emergency regulations to reduce anticipated effects of the pelagic longline fishery on sea turtles. This section describes the alternatives NMFS has considered that could reduce the bycatch of sea turtles, as well as measures that could reduce the serious injury of those sea turtles that are incidentally captured in the Atlantic HMS pelagic longline fishery and in other HMS fisheries.

5.1 Measures to Reduce Bycatch of Sea Turtles

Alternatives discussed in this section examine ways to reduce the overall take of sea turtles in the Atlantic pelagic longline fishery through an area closure and gear deployment restrictions.

Final Action: **Closure of the NED area to pelagic longlining for the duration of the emergency rule[3] beginning July 15, 2001**

This action will close the NED area (20 to 60° W, 35 to 55° N, see Figure 3.1) to HMS fishermen who use pelagic longline gear beginning July 15, 2001, and lasting for the duration of the emergency rule. Compliance with this action will be enforced through the use of United States Coast Guard at-sea resources, such as cutter patrols and fly-overs. This action is consistent with national standard 9 of the Magnuson-Stevens Act by reducing, to the extent practicable, the bycatch of sea turtles captured in the Atlantic pelagic longline fishery. NMFS expects an experimental fishery to be conducted in this area to examine gear modifications that will reduce the incidental capture of sea turtles, contingent on approval of the permit application by the NMFS Office of Protected Resources.

Ecological Impacts

Observer and logbook data from pelagic longline vessels in the NED area in the third and fourth quarters (July to December) indicate high levels of sea turtle bycatch over the past several years. For example, based on logbook data from 1997 to 1999, closing the NED area for the entire year would reduce the number of loggerhead and leatherback turtles captured in this fishery by 76 percent and 65 percent, respectively, assuming no redistribution of the fishing effort displaced out of the NED. Even assuming that all of the fishing effort that occurred in the NED area shifts into the adjacent area, the Northeast Coastal statistical reporting area, which also has a high bycatch rate, the number of takes per year would still be reduced by 67 percent for loggerheads and 58

[3] Emergency rules are effective for 180 days from the date of publication in the Federal Register. Emergency rules may be extended for an additional 180 days if notice and a comment period are provided.

percent for leatherbacks, based on the logbook data (Table 5.1). Additionally, Hoey and Moore (1999) stated that in many cases, two or more sea turtles have been caught per longline set in the NED area, which indicates that pelagic longline fishing in this area poses a potentially greater risk to listed species of sea turtles than pelagic longline fishing in other areas (where multiple sea turtle takes per set are less frequent). Hoey and Moore (1999) found that the NED area was the only observed area where four or more sea turtles were caught on a single set, and that 19 sets caught three sea turtles and 22 sets caught two sea turtles (contrasted to the mid-Atlantic Bight (MAB) and Northeast Coastal (NEC) areas where three sets caught three sea turtles, and 11 sets caught two sea turtles).

Table 5.1 **The estimated percent reductions of leatherback and loggerhead sea turtles interactions for the NED area closure under the no effort redistribution and effort redistribution models. Based on logbook reports from 1997 through 1999.**

	Number of leatherback sea turtles reported caught in NED area	Number of loggerhead sea turtles reported caught in NED area	Percent reduction of leatherback sea turtles		Percent reduction of loggerhead sea turtles		Percent reduction if all the effort in the NED area goes to the NEC area	
			No effort redistr.	Effort redistr.	No effort redistr.	Effort redistr.	Leatherback	Loggerhead
Jan.	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Feb.	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Mar.	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Apr.	0	0	0.00	0.00	0.00	0.00	0.00	0.00
May	1	6	0.27	0.27	0.47	0.47	0.27	0.46
Jun.	18	56	4.84	4.48	4.42	4.09	3.94	1.90
Jul.	81	473	21.77	21.30	37.30	36.19	21.02	33.25
Aug.	60	137	16.13	15.20	10.80	10.22	13.47	8.93
Sep.	43	140	11.56	10.90	11.04	10.70	9.56	10.41
Oct.	37	154	9.95	9.79	12.15	11.97	9.37	11.53
Nov.	1	2	0.27	0.22	0.16	0.14	0.27	0.14
Dec.	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Tot.	**241**	**968**	**64.78**	**62.51**	**76.34**	**74.81**	**57.90**	**66.62**

Initially, the closure may result in fewer target and bycatch species, such as swordfish, blue sharks, and sea turtles, being captured by pelagic longlines. The NED area is one of the highest

areas of blue shark discards for U.S. fishermen and has the greatest incidence of sea turtles interactions. However, these reductions attributable to the U.S. fleet may be inconsequential if foreign fleets expand fishing effort in the NED area.

Economic and Social Impacts

Depending on the course of action taken by individual vessels, this action could have large economic impacts on the vessels that normally fish in the NED area (10 vessels in 1999; Cramer and Adams 2001). Those vessels could volunteer to participate in the experimental fishery in the NED area. The vessels that do would be able to continue fishing in the NED area pursuant to the terms of the experimental fishery, and could receive some monetary compensation to offset lost revenues attributable to gear modifications. Thus, participating vessels would not be significantly affected by this action. Affected vessels could also decide to fish in the open areas either near shore (compared to the NED area) or farther away from their current homeports (e.g., the Caribbean). Those vessels that stay near shore would probably have fewer variable costs and could spend time usually spent traveling on fishing. However, none of the ex-vessel gross revenues from these other areas are, on average, as large as those expected from fishing in the NED area (see Table 6.2) so any vessel that chooses this course of action may experience some decreased revenue. These impacts of increased costs and decreased revenues may be enough to put some of the vessels out of business. Vessels could also reflag to another country. NMFS is unsure what net economic costs or benefits might arise for the individual vessel under this circumstance.

Because the fishermen in the NED area report landing approximately 20 percent of all the swordfish landed by commercial U.S. fishermen, closing the NED area could also have an adverse impact on dealers. However, the experimental fishery could mitigate any impacts on dealers.

Consumers may notice a decrease in the supply of fresh fish if importers are unable to increase their supplies. Also, as a result of the BO and this emergency rule, consumers may perceive U.S.-caught fish as more environmentally sound and demand domestic fish. If this occurs, it's possible that fishermen fleet-wide may experience an increase in ex-vessel revenues depending on the demand of consumers.

This closure could have noticeable impacts on the communities that depend on the vessels that fish in the NED area. Any impact would depend on the course of action taken by each individual vessel.

Other

Monitoring of the closed area will be accomplished by the United States Coast Guard through the use of at-sea resources, such as cutter patrols and fly-overs. In the future, VMS might be utilized as a method of enforcing closed areas.

Conclusion

This action is necessary to reduce the number of sea turtles taken incidentally by the pelagic longline fleet in the Atlantic Ocean. Because the NED area has the highest rate of sea turtle interactions, closing the entire area could drastically reduce the number turtles captured in this fishery. While this action will have large adverse economic impacts to a few vessels, based on the criteria of E.O. 12866, this action is not significant (see Section 6.3). However, if the majority of the vessels impacted by the closure participate in the experimental fishery in this area or reflag, then the potential severity of the economic impact will be reduced. Because fishing activity in the NED area primarily occurs between July and October, if this emergency rule is extended another 180 days after its expiration, no additional impacts are expected.

Final Action: Prohibit the setting of gangions next to floatlines

This action will prohibit gangions from being attached next to floatlines or to the mainline except at a distance from the attachment point of the floatline to the mainline, along the mainline, of twice the length of the average gangion length in the set (see Figure 5.1). The purpose of this measure is to decrease the potential for turtles to become hooked by increasing the average depth of the hooks.

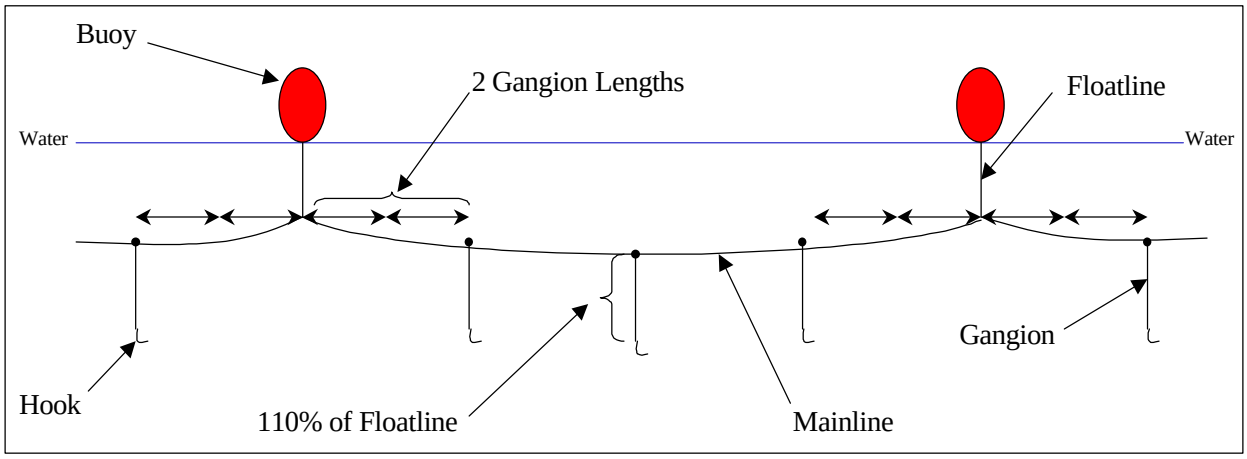

Figure 5.1 Depiction of Atlantic pelagic longline gear based on the regulations promulgated in this emergency rule.

Ecological Impacts

Hooks that are beneath or adjacent to floatlines have a much higher sea turtle catch rate than hooks one or more positions away from the floatline (Kleiber 2000, NMFS SWFSC, unpubl. report). In observer data from the Hawaii fleet, hooks nearest the floatline caught 45 percent of all loggerheads, but only represented 19 percent of the hooks fished on sets that caught loggerheads. Hooks nearest the floatline caught 49 percent of all leatherbacks, but only represented 17 percent of the hooks fished on sets that caught leatherbacks. Eliminating hooks in this position could, theoretically, reduce takes of leatherbacks and loggerheads by as much as 49

percent and 45 percent, respectively. The June 8, 2001, BO noted that such a result is unlikely as turtles might still be caught on the hooks set farther from the floatline. The June 8, 2001, BO further states that the hook nearest the floatline is 2 to 2.4 times more likely to catch sea turtles than the hook one position from the floatline and that the hook one position from the floatline, in turn, is 5.7 to 7 times more likely to catch sea turtles than the hooks two or more positions from the floatline. Using this information, the June 8, 2001, BO estimates that this action will reduce the capture of turtles by 22 percent for loggerhead sea turtles and 24 percent for leatherback sea turtles.

Moving gangions away from floatlines may decrease the catch of target species and some bycatch species. Some swordfish fishermen add the gangion adjacent to the floatline because they believe that the action imparted to the hook by wave motion makes the bait presentation more attractive to swordfish (Thompson 2001). However, a preliminary analysis of data on swordfish caught in the Hawaii-based fishery indicates that the distribution of all hooks that caught swordfish was not much different from the distribution of all hooks available to the swordfish (Thompson 2001). This requirement may not affect the number of hooks fished per set if the length of the mainline is increased or the hook spacing is decreased to maintain a similar number of hooks.

Economic and Social Impacts

This action would have minimal economic impacts on fishermen or communities. Fishermen may decide to buy additional monofilament to extend the length of the mainline if they decide to keep the same spacing of hooks between floatlines. However, NMFS expects that many fishermen will decide to set hooks closer together, thus minimizing the need for any additional gear. NMFS does not expect this action to affect the catch rates of target catch. Thus, ex-vessel gross revenues and variable costs would not change as a result of this action.

Conclusion

This action is expected to reduce the capture of sea turtles by moving the gangions farther away from the floatlines. Because the fishermen will likely maintain the number of hooks per set, NMFS expects that the level of target catch harvested will not be compromised. Based on the level of reductions estimated in the BO, this measure should contribute toward reducing the mortality rate of the sea turtle populations. NMFS expects to test this mitigation strategy further during the experimental fishery.

Not Selected at this Time: Prohibit the use of certain types of bait

Several technical gear workshops have generated information from industry participants recommending that alternative types of bait may provide an effective mitigation technique when compared to natural squid in reducing the number of sea turtles incidentally captured by pelagic longline vessels.

Ecological Impacts

Research in Hawaii has shown that blue dyed squids reduce the bycatch of seabirds and possibly increase the catch of swordfish. When field-testing blue bait on seabirds, no turtles were caught. However, turtles were caught with normal bait during the study (Kleiber and Boggs 2000). Laboratory tests conducted in Hawaii have shown that green turtles in captivity are reluctant to take blue dyed squid compared to normal squid, but eventually habituate to dyed bait (NMFS 2001c.). The NMFS Galveston Texas Laboratory will conduct laboratory tests on colored squid baits with loggerhead sea turtles to complement the Hawaii studies. The NMFS Honolulu laboratory plans to conduct tests on commercial longline vessels in 2001 using blue dyed squid. Also, the experimental fishery being planned for the NED area using vessels of the Atlantic pelagic longline fleet would analyze the use of blue-dyed squid as well as the effectiveness of using mackerel as bait. Until the results of the experimental fishery are analyzed, the effect of different bait types on both target and incidental catch are uncertain.

Economic and Social Impacts

Depending on the type of bait required or restricted, this action could have substantial economic impacts on fishermen and any related businesses. The actual effect depends on a number of factors including how expensive the required bait would be compared to the bait used now, how difficult it is to buy or supply this bait, how often bait suppliers need to replenish their supplies, and how effective the required bait is at catching the target catch. NMFS cannot analyze the possible impacts until the bait specifications are tested.

Conclusion

This alternative would prohibit the use of natural squid as bait in the pelagic longline fishery. It is not selected at this time due to the uncertainty of the effectiveness of alternative baits on target catch rates and on the incidental capture of sea turtles. The experimental fishery being planned for the NED area will examine the efficiencies of several bait types. NMFS may promulgate regulations in the future based on the results of this research.

Not Selected: No action (status quo)

This alternative would maintain existing regulations for the pelagic longline fishery in the Atlantic Ocean and Gulf of Mexico but would impose no additional restrictions aimed at reducing turtle interactions. Current regulatory measures include: the MAB time/area closure for bluefin tuna; the DeSoto Canyon, Florida east coast, and Charleston Bump time/area closures for swordfish and billfish; limited access for swordfish, tuna, and sharks; and restrictions on retention for swordfish, bluefin tuna, yellowfin tuna, bigeye tuna, and sharks. Currently, commercial vessels utilizing pelagic longline gear are prohibited from retaining, possessing or selling all Atlantic billfish and Atlantic swordfish under 33 pounds dw. This alternative would not be expected to reduce sea turtle bycatch from current levels.

Ecological Impacts

The status quo alternative would not change current fishing practices in the Atlantic pelagic longline fleet. The status quo alternative would not reduce sea turtle bycatch from current levels.

Economic and Social Impacts

The status quo alternative would not change the current costs of commercial fishing, nor of any of the associated support industries. No changes in fishing practices or behavior of pelagic longline fishermen would be expected under the status quo alternative.

This alternative would have the least amount of economic and social impact on pelagic longline fishermen and their respective communities of any alternatives considered in this document in the short-term, because this alternative would not change current management of the U.S. pelagic longline fishery in the Atlantic Ocean. However, because the status quo does not further reduce sea turtle bycatch and would continue to have negative impacts on sea turtle recovery, this alternative would likely have direct negative impacts on pelagic longline vessel owners, captains, crew, and dealers as well as indirect negative impacts on fishing communities in the medium- to long-term if the fishery must be closed to reduce impacts on sea turtles.

Conclusion

The status quo alternative is rejected because it does not reduce sea turtle bycatch from current levels, and would likely result in the need for greater restrictions on pelagic longline fishing in the medium- to long-term if no action is taken in the short-term.

Not Selected: **Prohibit use of pelagic longline gear by U.S.-flagged fishing vessels in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea**

This alternative would prohibit the use of pelagic longline gear in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea HMS fisheries at all times. This alternative would eliminate sea turtle bycatch and bycatch mortality in this fishery. This alternative was previously discussed in detail in Section 7 of the Final Supplemental Environmental Impact Statement to reduce bycatch, bycatch mortality, and incidental catch in the Atlantic pelagic longline fishery for a previous rulemaking (NMFS 2000b) and was rejected due to the availability of other alternatives that would meet conservation requirements with less severe economic and/or social impacts.

Ecological Impacts

The Final Supplemental Environmental Impact Statement to reduce bycatch, bycatch mortality, and incidental catch in the Atlantic pelagic longline fishery (NMFS 2000b) noted that landings of target species such as swordfish, as well as interactions with bycatch species such as sea turtles, would be eliminated from the U.S. portion of the total Atlantic-wide longline fishery, although

foreign longline fishing effort may increase in areas beyond the U.S. EEZ such as the NED area. Accordingly, Atlantic-wide landings of target species and interactions with bycatch species may not decrease but may actually increase if foreign fishing effort increases due to elimination of the U.S. pelagic longline fishery.

Economic and Social Impacts

The Final Supplemental Environmental Impact Statement to reduce bycatch, bycatch mortality, and incidental catch in the Atlantic pelagic longline fishery also notes that abolishing the use of pelagic longline gear by U.S. commercial fishing vessels would have immediate and significant economic and social impact directly on pelagic longline vessel owners, captains, and crew that would need to re-rig their vessels to continue fishing for HMS, find alternate fisheries, or discontinue fishing; dealers that purchase fish from pelagic longliners; families that work or own the fishing vessels that would have to either re-rig their vessels or discontinue fishing; and indirect impacts on the local communities that support the pelagic longline fishery. However, importers of HMS fishery products from foreign markets would likely see an increase in business as restaurants, fresh seafood markets, and other businesses would seek alternative sources to replace seafood products previously purchased from U.S. pelagic longline fishermen. As a result of the drop in domestic supply, U.S. consumers might notice a decrease in quality (less fresh product, more frozen product, less quality control). This decrease in quality could result in a decrease in consumer surplus and therefore a decrease in net economic benefit.

Conclusion

This alternative is rejected for reasons mentioned above and discussed in more detail in the Final Supplemental Environmental Impact Statement to reduce bycatch, bycatch mortality, and incidental catch in the Atlantic pelagic longline fishery. Additionally, this alternative is rejected due to the potential expansions in foreign pelagic longline fishing effort that may result in increased bycatch and bycatch mortality of sea turtles in the NED area, which would likely negate the positive impacts of a prohibition of pelagic longline gear in U.S. fisheries.

5.2 Measures to Reduce Mortality of Incidentally Captured Sea Turtles

Alternatives discussed in this section examine ways to reduce the post-release mortality of sea turtles taken in the Atlantic pelagic longline fishery through gear requirements.

Final Action: **Require gangion length to be 110 percent of floatline length in shallow sets (hook depth of 100 meters or less)**

As there are documented occurrences of drowned sea turtles being recovered following incidental capture on pelagic longline sets, gangions are required to be 10 percent longer than floatlines if

the combined depth is 100 meters or less (see Figure 5.1). This is required so that sea turtles have a greater chance of reaching the surface following hooking or entanglement.

Ecological Impacts

The intent of this requirement is to ensure that hooked turtles have sufficient slack line to be able to reach the surface and avoid drowning. Specifically, for longline sets in which the combined length of the floatline plus the gangion is 100 meters or less, the length of the gangion must be 10 percent longer than the length of the floatline. The purpose of this measure is to reduce the likelihood of mortality to turtles that become hooked or entangled. No quantitative estimate of the effectiveness of this measure can be made at this time. While allowing turtles access to the surface would certainly be beneficial, it is recognized that due to the dynamic nature of the ocean environment, fishing gear does not remain stationary following deployment. It will float and sink based on prevailing local ocean currents. This behavior of the gear makes it very difficult to assess the impacts of this measure. NMFS does not expect this action to change target or incidental catch rates.

Economic and Social Impacts

NMFS does not expect this action to have large impacts on fishermen or their communities. To comply with this regulation, fishermen could lengthen their gangions. This option would require fishermen to buy additional monofilament and cause an increase in labor in the short term to replace existing gangions. Alternatively, they could shorten their floatlines. The second option would not require any additional monofilament but would require labor to adjust the length of the existing floatlines. While either alternative could affect the number of target fish caught, NMFS does not expect a significant reduction.

Conclusion

Given the lack of data, a prediction of the reduction in sea turtle bycatch attributable to this action is not possible. A very small percentage of captured sea turtles are recovered dead, but this measure should reduce the mortality rate to some extent. Also, having the gangion longer than the floatline should allow turtles to reach the surface, which would reduce the physiological stress placed on the captured animals, reducing their post-release mortality. NMFS does not expect any economic or social impacts as a result of this action.

Final Action: **Require the posting of the sea turtle guidelines for safe handling in longline interactions inside the wheelhouse**

While the handling/release guidelines were developed for interactions with pelagic longline gear, the measures described are applicable to all vessels that may incidentally capture, via hooking or entanglement, sea turtles during fishing operations. Thus, NMFS is requiring that they be posted in the wheelhouse of all vessels permitted or required to be permitted for HMS fisheries.

Ecological Impacts

By following these handling and release guidelines, incidentally captured sea turtles can be released with the minimum of harm. This will improve the post-release survival of the affected animals which will decrease overall mortality of the populations of concern.

Economic and Social Impacts

This action should have no economic or social impacts to fishermen or communities because NMFS is supplying copies of the guidelines.

Conclusion

This action requires all vessels with HMS permits to post handling and release guidelines in the wheelhouse of their vessels. While the guidelines specifically apply to pelagic longline gear, NMFS feels that the measures are applicable to all vessels. Having this information readily available will allow incidentally captured sea turtles to be released with the greatest possible chance of survival.

Not Selected At This Time: Require dehooking devices to be used and carried on board all pelagic longline vessels

This alternative would require all pelagic longline vessels that hold Federal HMS permits to carry on board at all times and to use dehooking devices to remove hooks that are clearly visible externally or in the mouth or beak. If an effective design specification and procedures for when and how to use the device were available, this alternative would reduce serious injury or mortality of incidentally captured sea turtles by reducing the number of hooks that remain embedded in sea turtles after release.

Ecological Impacts

This alternative could reduce serious injury and/or mortality of incidentally captured sea turtles by removing a higher percentage of externally visible or mouth/beak hooks than currently occurs. To the extent that external or mouth/beak hooks contribute to post-release mortality, this alternative could contribute to sea turtle recovery unless damage was done to the turtle during the dehooking process. This alternative would not require deeply embedded or ingested hooks to be removed due to concerns that more damage may be done to the turtle by removing the hook than by leaving it in place.

Economic and Social Impacts

This alternative would impose minimal additional economic and social costs attributable to sea turtle handling and release costs to the prior final actions that already require line clippers and dipnets to be carried on board vessels. This alternative would require some additional time during gear haulbacks to ensure externally visible or mouth/beak hooks were removed. The costs

associated with this alternative would depend on whether a specific dehooking device would be required or, as with the required line clippers and dipnets, design specifications would be established that allow fishermen to develop their own device. As stated in the HMS FMP, most dehooking devices designed to release large fish cost between $45 and $90. As with the required line clippers and dipnets, an increase in positive media coverage due to improved sea turtle handling and release techniques may improve public perception of fishing practices of the pelagic longline fleet, thus leading to an increased demand for their product and possibly, increased prices.

Conclusion

This alternative is not selected at this time due to the lack of appropriate design specifications for a dehooker that would allow safe removal of externally visible or mouth/beak hooks. Further research needs to be conducted on possible design specifications for dehooking devices that could be easily handled by fishermen using different gear configurations and that would do no further damage to the hooked turtles. NMFS intends to work with the pelagic longline industry in the near future to conduct testing of dehooking devices to assess their effectiveness on reducing sea turtle post-release mortality. While NMFS does not requiring their use, at this time, NMFS also does not prohibit the use of dehooking device. Further, NMFS is aware that some fishermen already voluntarily use dehooking devices.

Not Selected At This Time: Require use of corrodible hooks on all pelagic longline gear

This alternative would require all pelagic longlines on vessels that hold Federal HMS permits to be rigged with corrodible hooks only. The use or possession of non-corrodible hooks would be prohibited if a pelagic longline was on board. This alternative is one element of the RPA of the June 8, 2001, BO and is therefore required to be implemented. However, the June 8, 2001, BO gives NMFS until March 1, 2002, at the latest, to identify criteria for corrodible hooks and crimps that are effective at reducing post-hooking injury, assess, and develop if needed, the commercial availability, and promulgate regulations requiring the use of such hooks and crimps.

Ecological Impacts

This alternative may increase the survival of released sea turtles by requiring pelagic longline gear to be rigged with hooks that corrode quickly and thereby reduce the amount of time any ingested or deeply hooked hooks would remain embedded in the turtle after its release. Depending on how quickly corrodible hooks dissolve, this alternative may reduce the serious injury and/or mortality of gear not readily removed from hooked sea turtles. Depending on how strong the corrodible hooks are, this alternative may have an impact on catch rates of all species and, subsequently, on the post-release survival of these species.

Economic and Social Impacts

Depending on how "corrodible" is defined, this alternative could result in increased costs and decreased revenues for pelagic longline vessel owners, captains, and crew. If corrodible is defined as non-stainless, then the increased costs and decreased revenues may be minimal because many pelagic longline vessels are currently rigged with non-stainless hooks already. Those vessels that are currently rigged with stainless hooks would have increased direct costs of replacement hooks and crew time to re-rig the gear. As corrodible hooks would dissolve more quickly than stainless hooks, then, under this alternative, those vessels would also have continued replacement hook and re-rigging costs.

However, if corrodible is defined as a specific hook type, hook coating, or alloy content, then economic and social impacts could be substantial. Economic cost increases could range from high initial hook replacement and re-rigging costs for all pelagic longline vessels upon implementation of the requirement to long-term increased hook replacement costs if the corrodible hooks are more expensive to manufacture and would need to be replaced more frequently due to their higher corrodibility. Revenues could decrease if the corrodible hooks are not commercially available so that fishermen could not fish until new hooks were manufactured or if target catches decrease as if corrodible hooks cannot retain swordfish or tuna as well as currently used hook types. Revenues of hook suppliers could also be impacted if they are unable to sell any non-corrodible hooks in their inventory.

Conclusion

This alternative is not selected at this time due to the uncertainty regarding the definition of "corrodibility," its effectiveness in reducing sea turtle post-release mortality, and its impact on target catches. If target catches are substantially reduced, fishermen may offset that reduction in ways that may either negate any decrease or actually increase sea turtle interactions (extend the length of the mainline, increase soak time, fish more total hooks per set, increase the number of lightsticks per set). NMFS believes that further testing of such modifications is necessary to determine their effectiveness. Currently, NMFS is testing existing hook types to determine their level of corrodibility. Based on the results of this study, measures may be implemented in the near future to require specific hook types.

Not Selected At This Time: Require use of circle hooks on all pelagic longline gear

This alternative would require that all pelagic longlines on vessels that hold Federal HMS permits be rigged with circle hooks. The use or possession of straight shank or "J" hooks would be prohibited if a pelagic longline was on board. This alternative was discussed in detail in Section 7 of the Final Supplemental Environmental Impact Statement to reduce bycatch, bycatch mortality, and incidental catch in the Atlantic pelagic longline fishery (NMFS 2000b) and was not selected at during that rulemaking due to uncertainty regarding the effectiveness of reducing sea turtle bycatch and impacts on target catches and concerns that the measure would be difficult to enforce.

Ecological Impacts

A variety of fishhook styles are used in the pelagic longline fisheries (D. Lee, pers. comm. 2000 *in* NMFS SEFSC 2001). Boats may fish several styles of hooks at any one time depending on target species and hook availability. The swordfish fishery uses traditional "J" style hooks while the tuna fishery uses circle hooks.

From July to December, 2000, researchers experimented with different styles of hooks in the commercial longline fishery in the Azores Islands to determine the effect on sea turtles incidentally captured in the fishery. Three hook types were tested: straight "J"(Mustad #76800 D 9/0), reversed/offset "J" (30/0-32/0) (Mustad #76801 D 9/0), and circle (Mustad #39960 ST 16/0). The experimental fishery caught 232 loggerhead, 4 leatherback, and 1 green turtle. There was no significant difference in the total numbers of turtles caught by each hook type (Chi-square test, $p=0.136$). However, there was a significant difference among the 3 hook types in the percentage of turtles hooked in their throats (Chi-square test, $p<0.001$): Standard "J" Hook, 57 percent; Offset "J", 46 percent; and Circle Hook, 11 percent (NMFS 2001c). Based on this experiment, there is a clear relationship between the type of hook and sea turtle injuries. The experiment also suggests that the location of hooking can be changed by changing the type of hook, which has implications for the post-release survival of sea turtles.

Although the results of these initial experiments with circle hooks were promising, their use is being debated for a variety of reasons. Changing from "J" to circle hooks may adversely affect the catch rates of target species, particularly for the swordfish fleet. In the Azores experiment, there was a significant difference among the hook types in the numbers of swordfish caught. The circle hook caught 262 swordfish and the "J" hook caught 381 swordfish (a 31.1 percent difference). NMFS received comments that larger gauge circle hooks (18/0) may improve the retention of target species. NMFS expects to test this hypothesis within the year. In addition, several fishermen have commented that it is much more difficult to remove a circle hook from a turtle's mouth than the commonly used "J" hook, because circle hooks are easier to swallow, and fishermen could unintentionally aggravate hooking injuries while attempting to remove circle hooks (Beideman, Budi, pers. comms. 2001).

Economic and Social Impacts

In the short-term, requiring the use of circle hooks could increase the cost of fishing but would have little impact on communities. While circle hooks cost less than "J" hooks ($0.25 versus $0.79, respectively), this requirement would force fishermen to replace all of their hooks immediately instead of over time. Replacing "J" hooks with circle hooks could cost each individual fisherman just under $10,000 (see Section 6.2). In addition to affecting fishermen, this action could affect suppliers who may have already stocked up on "J" hooks and may be unable to replace stocks with circle hooks before the effective date of this rule. Additionally, requiring the use of circle hooks would likely affect catch rates. At this time, NMFS is unable to estimate changes in catch rates and cannot evaluate impacts.

Conclusion

This alternative is not selected at this time due to the uncertainty of its effectiveness in reducing sea turtle interactions (bycatch and post-release mortality) and its impact on target catches. If target catches were to be substantially reduced, fishermen could attempt to offset that reduction (e.g. extend the length of the mainline, increase soak time, fish more total hooks per set, increase the number of lightsticks per set). These adjustments may either negate any decrease or actually increase sea turtle interactions. NMFS received comments during scoping workshops on implementation of the June 30, 2000, BO that gear deployment modifications may be supported by the pelagic longline industry and may be preferable to other alternatives such as time and area closures. While NMFS continues to consider gear deployment modifications as potential methods to reduce sea turtle interactions, NMFS believes that further testing of such modifications is necessary to determine their effectiveness.

6.0 REGULATORY IMPACT REVIEW

Under Executive Order (EO) 12866, Federal agencies are required to "assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. . . Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach." In order to comply with EO 12866, NMFS prepares a Regulatory Impact Review (RIR) that analyzes the net economic benefits and costs of each alternative to the nation and the fishery as a whole. This section of this document assesses the economic impacts of the alternatives considered in the development of this rulemaking. However, certain elements required in an RIR are also required as part of an environmental assessment (EA). Thus, this section should only be considered part of the RIR. The rest of the RIR can be found throughout this document. Section 1 of this document describes the need for action and the objectives of the regulations. The alternatives considered are described in Section 5 and include measures designed to reduce bycatch of sea turtles and measures designed to reduce post-release mortality of sea turtles.

This section focuses on the impacts of this emergency rule on fishermen issued, or required to have, HMS permits, who use pelagic longline, particularly those who fish in the NED area. The primary target species of that segment of the pelagic longline fishery is swordfish. Other segments of the pelagic longline fishery constitute a mixed fishery with swordfish, bigeye tuna, yellowfin tuna, and albacore tuna constituting the target species. In addition to the fishermen, the related industries including dealers, processors, bait houses, and equipment suppliers are also part of this fishery.

6.1 Analyses of management measures to reduce bycatch of sea turtles

One of the final actions in this emergency rule and one of the reasonable and prudent alternatives in the June 8, 2001, BO closes the NED area as of July 15, 2001 to U.S. fishermen who use pelagic longline gear. Table 6.1 presents the information from Cramer and Adams (2001) regarding the1998 and 1999 fishing activity in all the pelagic longline statistical reporting areas. Cramer and Adams (2001) state that 10 vessels fished in the NED area in 1999, down from 15 active vessels in 1998 and 22 active vessels in 1997. In 1999, these 10 vessels landed 11,932 swordfish or 18.5 percent of the 64,365 swordfish landed by the entire U.S. Atlantic pelagic longline fleet (193 vessels)(Table 6.2). The 15 vessels active in the NED area in 1998 landed 19.7 percent of all the swordfish landed (67,633) by the fleet (210 vessels) (Table 6.2). Thus, although few fishermen actively participate in the NED area each year, the fishermen that are active in the NED area report landing a substantial amount of the swordfish landed by the entire fleet and closing the area could reduce the amount of domestic swordfish available for consumption if the supply shortfall could not be made up from other fishing areas or through increased imports. This reduction in swordfish landings could also affect dealers, especially those who are supplied by the

vessels fishing in the NED area, who as a result of the closure would receive approximately 20 percent fewer swordfish to process. Bait houses and equipment suppliers would not be affected as much as dealers or fishermen because, in the worst case scenario, only 10 to 22 vessels would go out of business as a result of the closure of the NED area. Presumably, bait houses and equipment suppliers rely on more than 10 to 20 vessels to remain in business, although NMFS realizes that these 10 to 20 vessels, on average, probably require more bait and equipment than many other vessel types. Although domestic swordfish landings could decrease, U.S. consumers would not likely be affected because the United States already imports large amounts of swordfish each year from other countries (13,842,970 kg in 1999; NMFS, 2001d) and importers would likely expand their business depending on demand.

Using the data presented in Table 6.1, the ex-vessel price information available in the 2001 SAFE report (NMFS, 2001d), and the total weight of swordfish reported to ICCAT in the U.S. National Report (NMFS, 2000c), the total annual ex-vessel gross revenues from swordfish alone for the 10 vessels fishing in the NED area were approximately $3.2 M in 1999 with an average annual ex-vessel gross revenue of $323,532 per vessel. Similarly, the 15 vessels active in 1998 landed approximately $3.6 M in total ex-vessel gross revenues from swordfish alone with an average of $237,753 ex-vessel gross revenues per vessel (Table 6.2). If information more specific to NED area vessels and their NED area landings is used (i.e., weights reported to dealers in ports commonly used by vessels fishing in the NED area and the addition of bigeye tuna revenues), the results of the average ex-vessel gross revenues calculations change a little (Table 6.3). In this case, the average annual ex-vessel gross revenues per vessel for 1999 is $325,545 and for 1998 is $188,561. Both methods indicate that vessels that fished in the NED area in 1999 had higher average ex-vessel gross revenues per vessel than vessels that fished in 1998.

Using the first method outlined above also indicates that the estimated total annual ex-vessel gross revenues and the estimated average annual ex-vessel gross revenues per vessel is much higher for the NED area than for any other statistical area (Table 6.2). The average annual ex-vessel gross revenues per vessel for vessels in areas other than the NED area is $41,053 in 1998 and $46,473 in 1999. While vessels that fish in the NED area appear to have much higher ex-vessel gross revenues than vessels that fish in other areas, these vessels also have much higher variable costs in terms of fuel, maintenance, repairs, and food (Porter et al. 2001, Larkin et al. 1998). Without specific cost information from all vessels, NMFS cannot estimate the average net revenues. Despite this, NMFS feels that vessels that fish in the NED area probably have higher net revenues, on average, than other vessels in the pelagic longline fishery due to the length of their trip, vessel size, and other requirements of trips far from shore. The estimated total annual ex-vessel gross revenues from swordfish for all areas except the NED area is $13.9 M for 1999 and $14.2 M in 1998. Thus, closing the NED could reduce the total annual ex-vessel gross revenues from swordfish caught by pelagic longline gear by almost 20 percent. NMFS expects that this emergency rule, because it occurs during the prime fishing season, would have similar impacts as an annual closure.

NMFS hopes that at least a few vessels who normally fish in the NED area will decide to participate in the experimental fishery NMFS anticipates conducting in the NED area (see section 4.3). If this happens, NMFS expects that those fishermen who participate would be compensated as appropriate and that dealers who rely on those fishermen would receive some of the swordfish normally expected. Additionally, bait houses and equipment suppliers would still be required by any of the participating vessels. Thus, the experimental fishery, if approved, could mitigate some of the economic impacts to those vessels that participate.

Any benefits to U.S. fishermen as a result of closing the NED area would arise if fishermen decided to fish in areas closer to shore. If the fishermen do decide to fish in open areas closer to shore, they will experience fewer costs in terms of fuel and may be able to spend the time usually spent traveling to the NED area fishing in those areas. If the fishermen who fish in the NED area land as many swordfish fishing in these other areas, they may experience higher net revenues. However, given the estimated gross revenues for vessels in these other areas, this may be unlikely. Instead, closing the NED area will likely have benefits for the nation as a whole in terms of the existence value of turtles. The existence value is the value that society at large places on the recovery of turtle populations. It is also possible that U.S. consumers would be willing to pay more for domestic swordfish if they perceive that the U.S. pelagic longline fleet is fostering sea turtle recovery and working towards a solution to reduce interactions with sea turtles for all international fleets. Although there is limited evidence of effective market segmentation in seafood trade, this could benefit dealers, processors, and fishermen.

Table 6.1 **The number of swordfish and tunas caught (kept and discarded) in 1998 and 1999.** (Source: Cramer and Adams 2001)

Area	Year	Swordfish	Yellowfin tuna	Bigeye tuna	Bluefin tuna	Albacore tuna	Number of vessels
CAR	1998	5,269	319	386	1	205	30
	1999	3,171	91	235	2	120	18
GOM	1998	12,131	37,623	415	173	82	98
	1999	12,684	59,050	507	319	104	89
FEC	1998	14,206	996	2,916	54	742	69
	1999	16,789	1,589	2,767	63	496	53
SAB	1998	19,974	1,656	92	16	93	53
	1999	19,638	5,658	118	14	47	45
MAB	1998	8,275	8,451	6,592	934	3,905	64
	1999	7,745	13,278	11,255	202	5.566	68

Area	Year	Swordfish	Yellowfin tuna	Bigeye tuna	Bluefin tuna	Albacore tuna	Number of vessels
NEC	1998	5,921	4,691	5,415	312	1,512	40
	1999	4,199	3,736	4,666	202	1,425	39
NED	1998	15,677	96	1,552	27	103	15
	1999	13,877	13	1,063	54	116	10
SAR	1998	159	29	219	24	278	9
	1999	208	162	45	4	49	4
NCA	1998	4,495	150	278	3	332	12
	1999	2,253	76	172	0	151	9
TUN	1998	1,117	722	784	0	97	12
	1999	534	291	279	0	13	9
TUS	1998	4,431	956	656	0	31	11
	1999	4,856	532	1,614	0	42	8
Total	1998	91,655	55,689	19,305	1,544	9,380	210
	1999	85,954	84,476	22,721	860	8,129	193

Table 6.2 **The estimated annual gross revenues for vessels from swordfish landed from all areas for 1998 and 1999.** The average price per lb. changes between areas. (Source: Cramer and Adams 2001; NMFS 2001d; NMFS, 2000c)

Area	Year	Swordfish landed	Total annual gross revenues for all vessels ($M)	Number of vessels	Average annual gross revenues per vessel ($K)
CAR	1998	4,260	$1.11	30	$36.9
	1999	2,600	$0.68	18	$38.0
GOM	1998	8,523	$2.22	98	$22.6
	1999	7,960	$2.10	89	$23.5
FEC	1998	9,003	$2.29	69	$33.1
	1999	12,259	$3.15	53	$59.4

Area	Year	Swordfish landed	Total annual gross revenues for all vessels ($M)	Number of vessels	Average annual gross revenues per vessel ($K)
SAB	1998	14,185	$3.60	53	$68.0
	1999	14,708	$3.78	45	$84.0
MAB	1998	4,918	$1.32	64	$20.7
	1999	4,709	$1.28	68	$18.9
NEC	1998	4,067	$1.09	40	$27.2
	1999	3,003	$0.81	39	$20.9
NED	1998	13,308	$3.57	15	$237.8
	1999	11,932	$3.23	10	$323.5
SAR	1998	137	$0.03	9	$3.8
	1999	171	$0.04	4	$11.0
NCA	1998	4,074	$1.03	12	$86.2
	1999	1,974	$0.51	9	$56.4
TUN	1998	882	$0.22	12	$18.7
	1999	427	$0.11	9	$12.2
TUS	1998	4,032	$1.02	11	$93.1
	1999	4,370	$1.12	8	$140.4
Total	1998	67,633	$17.76	210	$84.6
	1999	64,365	$17.10	193	$88.6

Table 6.3 **The estimated annual gross revenues for vessels from swordfish and bigeye tuna landed from the NED for 1997, 1998, and 1999 using data specific to those vessels that fished in the NED area.** Source: Data maintained by the NEFSC and SEFSC.

Year	Number of vessels	Average annual gross revenues per vessel ($K)
1997	22	$152.2

Year	Number of vessels	Average annual gross revenues per vessel ($K)
1998	15	$188.6
1999	10	$325.5
Average	16	$222.1

Another final action of this emergency rule is to prohibit the setting of gangions next to floatlines. This action affects all fishermen with HMS permits who use pelagic longline gear. This action could reduce the number of hooks in the water if fishermen maintain their current mainline length and gangion spacing between floatlines. If this happens, fishermen would have slightly lower equipment costs in that they would have fewer hooks and monofilament to buy. However, with fewer hooks per set, these fishermen would risk not catching as many fish resulting in lower ex-vessel revenues. NMFS expects that most fishermen who comply with the regulation will either lengthen their mainline to accommodate the extra space needed, decrease the space between gangions to fit all the hooks, or a combination of both. These fishermen might have to buy additional monofilament. In general, because fishermen would have to buy these supplies (monofilament and hooks) in the normal course of business, NMFS does not expect this action to have large economic impacts on fishermen, dealers, equipment suppliers, other related industries, or consumers.

Restricting the type of bait used could have adverse economic impacts on fishermen if the bait required is more expensive than the bait used now or is less effective at catching target species. This could also have an impact on bait houses if they are unable to immediately provide the type of bait required or if a significant number of fishermen go out of business as a result of the switch in bait. However, qualitative or quantitative analyses on the cost of bait is not possible until different bait types are tested.

While status quo would not have any immediate economic costs, it may have some in the long-run if consumers perceive fishermen to be harming sea turtles by fishing with pelagic longline gear. Prohibiting the use of pelagic longline gear would likely result in immediate significant economic costs to consumers, fishermen, dealers, processors, related industries, and communities. Importers may benefit if they expand their businesses. Additionally, society may benefit if sea turtles are conserved. However, as it is likely that international fleets would interact with as many or more sea turtles than the U.S. fleet does now, it is unclear if the recovery of sea turtles would occur in the long term.

6.2 Analyses of measures to reduce post-release mortality of sea turtles incidentally captured

Requiring gangion lengths to be 10 percent longer than the floatlines could increase costs for fishermen by requiring them to buy additional monofilament to lengthen the gangions. If the fishermen lengthen the gangions, they may also need to lengthen the mainline itself in order to fit as many hooks on the line given the final action to increase the amount of space between floats and the neighboring gangion. Fishermen could also decrease the length of the floatline by 10 percent and leave the length of the gangions alone. This option would not require additional monofilament. Either option could have some impact on the catch of fish although NMFS is unable to estimate that impact at this time. As with closing the NED area, this alternative may help U.S. fishermen in the long-term given the societal value for the preservation and recovery of sea turtles and the perception of consumers.

Requiring fishermen to post handling guidelines for sea turtles is not expected to have any economic impacts because fishermen would not need to buy any additional equipment.

Requiring a dehooking device is unlikely to increase costs or change gross revenues of fishermen substantially. The HMS FMP and a recent search on the internet indicate that dehooking devices for this fishery cost between $45 and $90. According to Cramer and Adams (2001) there have been an average of 220 active pelagic longline vessels each year since 1997. Thus, requiring all vessels to obtain and use a dehooker could bring equipment suppliers between $9,900 and $19,800 in gross revenues.

Requiring the use of circle or corrodible hooks could increase the cost of fishing. While circle hooks cost less than "J" hooks ($0.25 versus $0.79, respectively), this requirement would force fishermen to replace all of their hooks immediately instead of over time. Thus, this requirement could increase costs in the short-term. According to Cramer and Adams (2001), there were 7,593,912 hooks used in 1999. If all of these hooks were required to be replaced with circle hooks it would cost each individual fisherman approximately $9,837 (7,593,912/193 vessels * $0.25/hook). While the cost of a corrodible hook is unknown, NMFS expects that this requirement would have similar costs in the short-term. Additionally, corrodible hooks may need to be replaced more often than either "J" hooks or circle hooks further increasing the costs to fishermen over time. However, to the extent that some fishermen already use corrodible hooks (non-stainless steel hooks), this alternative may not change the cost of fishing (depending on the eventual standards determined for corrodible hooks). In addition to impacting fishermen, either one of these requirements could have a large impact on suppliers who may have already stocked up on "J" hooks and may be unable to replace stocks with circle or corrodible hooks before the effective date of this rule. Additionally, requiring the use of circle or corrodible hooks may impact catch rates. At this time, NMFS is unable to estimate changes in catch rates. However, if circle hooks or corrodible hooks are not strong enough to hold a large swordfish, gross revenues may decrease.

6.3 Conclusion

Under EO 12866 an action is considered significant if the regulations result in a rule that may:

1. Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
3. Materially alter the budgetary impacts of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in EO 12866.

The final actions described in this EA have been determined to be not significant for the purposes of EO 12866. While closing the NED area will adversely affect individual fishermen, dealers, and processors, it is unlikely it will have an adverse impact on the economy as a whole. None of the other final actions are likely to have large economic impacts. A summary of the expected net economic benefits and costs of each alternative can be found in Table 6.4.

Table 6.4 Summary of net economic benefits and costs for each alternative considered.

Management Measure	Net Economic Benefits	Net Economic Costs
Management Measures to reduce the bycatch of sea turtles		
Closure of the NED area to pelagic longlining for the duration of the emergency rule beginning July 15, 2001 **FINAL ACTION**	Fishing costs could decrease substantially if fishermen decide to fish in open areas closer to shore. To the extent that sea turtle bycatch may be decreased, handling time of turtles may decrease. This may decrease the time other species spend on the line thus increasing quality. Any decrease in turtle bycatch could increase benefits to society as a whole in terms of existence value.	May have a reduction in gross revenues to vessels that normally fish those areas because fishermen could be forced to fish in less productive areas. This could impact processors, dealers, and consumers.

Management Measure	Net Economic Benefits	Net Economic Costs
Prohibit the setting of gangions next to floatlines **FINAL ACTION**	Minimal.	Minimal.
Prohibit the use of certain types of bait	Unknown.	Unknown.
Status quo	Minimal.	In long-term, if the pelagic longline fishery adversely impacts sea turtles, sea turtles could go extinct. Assuming all animals have an existence value to society, this existence value would go to zero.
Prohibit use of pelagic longline gear by U.S.-flagged fishing vessels in the Atlantic Ocean, including the Gulf of Mexico and Caribbean Sea	Importers may benefit as demand for imported tunas and swordfish increases. No benefits for U.S. fishermen and related industries.	Loss of fishery in Atlantic putting fishermen, processors, bait houses, and suppliers out of business. Negative impacts may also be felt on consumers through the lack of domestically-caught fresh fish.
*Management Measures to reduce mortality of incidentally captured sea turtle*s		
Require gangion length to be 110 percent of floatline length in shallow sets (hooks fished at 100 meters or less) **FINAL ACTION**	Minimal.	Minimal.
Require the posting of sea turtle guidelines for safe handling in longline interactions inside the wheelhouse **FINAL ACTION**	None.	None.

Management Measure	Net Economic Benefits	Net Economic Costs
Require a dehooking device to be used and carried on board pelagic longline vessels	Minimal.	Minimal.
Require the use of corrodible hooks on all pelagic longline gear	Minimal.	If fishermen are not already using corrodible hooks, would require immediate replacement of all hooks. In long-term, could require hooks to be replaced more often than stainless steel hooks. If hooks are not strong enough to hold fish, could result in a loss in revenues.
Require the use of circle hooks on all pelagic longline gear	In long term, circle hooks cost less to replace than J hooks.	Would require immediate replacement of all hooks. If hooks are not strong enough to hold fish, could result in a loss in revenues.

7.0 COMMUNITY PROFILES

The National Environmental Policy Act (NEPA) requires federal agencies to consider the interactions of natural and human environments by using "a systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences ... in planning and decision-making" (NEPA §102(2)(a)). The Magnuson-Stevens Act also requires consideration of social impacts. Federal agencies should address the aesthetic, historic, cultural, economic, social, or health effects which may be direct, indirect, or cumulative. Consideration of the social impacts associated with fishery management measures is a growing concern as fisheries experience variable participation and/or declines in stocks.

Social impacts are the consequences to human populations that follow from some type of public or private action. Those consequences may include changes in "the ways in which people live, work or play, relate to one another, organize to meet their needs and generally cope as members of a society ... " (Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, 1994:1). In addition, cultural impacts may involve changes in the values and beliefs that affect the way that people identify themselves within their occupation, their communities, and society in general. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Public hearings, scoping meetings, and Advisory Panel meetings provide input from those concerned with the impacts of a proposed management action.

The following towns were considered for in-depth analysis during the emergency rule drafting process: Gloucester, MA; New Bedford, MA; Barnegat Light, NJ; Wanchese, NC. These towns were selected due to the importance of the fishing industry, particularly swordfish and tuna pelagic longline fishing, to the community. Much of this information presented below is discussed in greater detail in chapter 9 of the HMS FMP.

Gloucester, MA

Gloucester is known as the oldest seaport in the United States, established in 1623. Currently, it is one of the main ports along the Atlantic coast with regard to commercial and recreational fisheries with much of the target catch being HMS species. While bluefin tuna landings dominate the market, a small number of boats target swordfish on the Grand Banks from this port. Because this emergency rule closes the NED area and implements new gear restrictions, a small proportion of the vessel owners and operators may be impacted. Thus, the overall impacts on the community are expected to be low.

New Bedford, MA

New Bedford possesses one of the largest fishing fleets in the eastern United States and accounts for the second highest number of swordfish landed in Massachusetts. All of the pelagic longliners that land in New Bedford are large "distant water" vessels which follow swordfish throughout their migrations. In the summer and fall months, these vessels fish in the NED area and land their catch in New England ports. During the winter months, they fish in the Caribbean and ship their catch to the United States. Because of the nature of the fishery, researchers concluded that increased regulation of this fleet through time and area closures and gear modifications could lead to longer trips and increased strain on family life. Some vessels might reflag and move overseas to enable them to continue to fish the NED area unregulated. Another option would be to leave for the Carribean fishing grounds earlier than anticipated to avoid the new regulations. This would effect the broader community through a reduction in the demand for maintenance and supply of vessels and length of leave by family members. Even if the vessels fished outside of the NED area closure, there could still be a substantial negative impact on the amount of swordfish landed.

Barnegat Light, NJ

The Barnegat Light community is heavily dependent on its recreational and commercial fisheries as a source of income. It is known for its mid-Atlantic pelagic longline fishery which targets yellowfin and bigeye tuna for most of the year and swordfish for part of the year. Some of the fishermen from this area have become distant water operators, fishing in the NED area off Newfoundland, the waters off Greenland, as well as the Caribbean. One concern of the local residents is that the demise of commercial fisheries may transform the use of the waterfront, bringing residential development. The pelagic longline fleet in this area is under considerable strain due to increasingly stringent regulations, market difficulties, and problems in securing and retaining trained crew members. Many of the vessels are operating on thin profit margins which could be substantially impacted by requirements such as VMS, should that requirement become effective in the future.

Wanchese, NC

Approximately one third of the small businesses in Wanchese are commercial fishing or charter fishing related, demonstrating the reliance of the community on the marine environment. The mid-Atlantic pelagic longline fishery primarily targets swordfish, sharks, tunas, and dolphin. Pressure on this sector of the longline fishery is substantial due to the difficulty hiring and managing crew for the vessels. It is difficult to switch to different fisheries due to restrictive regulations or lower prices and commercial retention limits. Researchers found that increased restrictions on swordfish and tuna species will lead to increased pressure on dolphin and inshore species as well as movement of longline assets overseas. Generally, the regulations implemented

by this emergency rule should not have a substantial effect on this community due to the lack of boats fishing in the NED area.

Summary

Based on the current information available to NMFS, the emergency rule is not expected to have a substantial social impact on the majority of the communities examined in the HMS FMP. Only the New Bedford area has a large number of boats that frequently fish in the NED area, and thus would experience the greatest economic impact. The closed area could reduce a proportion of the swordfish landed per vessel, but a majority of the vessels that fish in the NED area have the capability to fish outside the closed area. Thus, while the vessels active in the regulated area could potentially have reduced landings, NMFS believes that because there are so few vessels that would be directly affected by the NED area closure, there would be few, if any, social impacts on most communities. The other final actions in this emergency rule could affect fishermen in all fishing communities. However, because the economic impacts for these actions are not expected to be large, NMFS does not expect large social impacts either.

8.0 FINDING OF NO SIGNIFICANT ENVIRONMENTAL IMPACT

Environmental Assessment for the Emergency Rule to Reduce Sea Turtle Bycatch and Bycatch Mortality in the Atlantic Pelagic Longline Fishery

Framework Adjustment to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks

Based on a review of this environmental assessment and the available information relative to the emergency rule, I have determined that there will be no significant environmental impacts from this action. This emergency rule is of limited duration and is expected to result in a reduction of overall sea turtle interactions and mortality with Atlantic pelagic longline fisheries. Accordingly, preparation of an Environmental Impact Statement (EIS) for this action is not required by section 102(2)(c) of the National Environmental Policy Act or its implementing regulations. NMFS intends to complete an EIS to accompany a proposed and final rule to implement these measures on a permanent basis. This EIS will examine the costs and benefits that will be incurred over a longer time period.

William T. Hogarth, Ph.D. July 6, 2001

Acting Assistant Administrator for Fisheries

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